02 P1	**1C, 3C** •1 $2\cos 2x$ •2 $2\cos 2x = -\sqrt{3}$ •3 $2x = \frac{5\pi}{6}$, $\frac{7\pi}{6}$ **ans: y = 2cos 2x** •4 $x = \frac{7\pi}{12}$ **ans:** $B\left(\frac{7\pi}{12}, -\sqrt{3}\right)$
1.(JAN) 02 P1	**1C, 2C** •1 $\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$ **and** $\cos\frac{\pi}{3} = \frac{1}{2}$ •2 $\tan x = \sqrt{3}$ •3 $x = \frac{\pi}{3}$, $\frac{4\pi}{3}$
03 P2	**3C** •1 $a = 4$ •2 $b = 2$ •3 $c = 1$ **OR** **y = 4sin(2x) + 1**
04 P1	**4C** •1 $\tan x = \sqrt{3}$ •2 $x = \frac{\pi}{3}$ •3 $x = \frac{4\pi}{3}$ •4 $\tan x = -\sqrt{3}$ stated explicitly ***and*** $x = \frac{2\pi}{3}, \frac{5\pi}{3}$ **OR** •1 $\tan x = \sqrt{3}$ •2 $x = \frac{\pi}{3}$ •3 $\tan x = -\sqrt{3}$ ***and*** $x = \frac{2\pi}{3}$ •4 $\frac{4\pi}{3}$ ***and*** $\frac{5\pi}{3}$
07 P2	**3C, 3C** •1 $a = 2$ •2 $b = 3$ •3 $c = -1$ •4 $2\sin(3x°) - 1 = 0$ •5 one answer from $10°$ or $50°$ •6 $x_P = 50°$ *alternative for* •4, •5 *and* •6 •4 sketch of graph with pointer to sol.point •5 extraction of $50°$ •6 confirmation of $2\sin(3\times 50°) - 1$ does $= 0$

ANSWERS **Pre 2000 Questions - Simple Trig Equations and Graphs**

1

$\bullet^1$ know to factorise, take square roots

$\bullet^2$ $\sin x = \frac{1}{2}$

$\bullet^3$ $x = \frac{\pi}{6}, \frac{5\pi}{6}$

$\bullet^4$ $\sin x = -\frac{1}{2}$ **and** $x = \frac{7\pi}{6}, \frac{11\pi}{6}$

OR

$\bullet^1$ replace $\sin^2 x$ by $\frac{1}{2}(1-\cos 2x)$

$\bullet^2$ $\cos 2x = \frac{1}{2}$

$\bullet^3$ $2x = \frac{\pi}{3}, \frac{5\pi}{3}, \frac{7\pi}{3}, \frac{11\pi}{3}$

$\bullet^4$ $x = \frac{\pi}{6}, \frac{5\pi}{6}\ \frac{7\pi}{6}, \frac{11\pi}{6}$

2

$\bullet^1$ $\cos x = \pm\frac{1}{2}$

$\bullet^2$ $x = \frac{\pi}{3}$

$\bullet^3$ $\frac{2\pi}{3}$

3

$\bullet^1$ $\sin 3x° = 0.5$

$\bullet^2$ $3x = 30, 150$

$\bullet^3$ $x = 10, 50$

$\bullet^4$ solution is $10, 50, 130$

4

$\bullet^1$ $a = 2$

$\bullet^2$ $b = 1$

$\bullet^3$ $c = 2$

$\bullet^4$ $2 + \sin 2x = 2\frac{1}{2}$

$\bullet^5$ $2x = \frac{\pi}{6}, \frac{5\pi}{6}$

$\bullet^6$ $x = \frac{\pi}{12}, \frac{5\pi}{12}$ (0·262, 1·309)

OR

$\bullet^4$ $2 + \sin 2x = 2\frac{1}{2}$

$\bullet^5$ $2x = \frac{\pi}{6}, x = \frac{\pi}{12}$

$\bullet^6$ $2x = \frac{5\pi}{6}, x = \frac{5\pi}{12}$

5

$\bullet^1$ $a \sin 3x = \frac{2}{3}a$ *stated or implied by* $\bullet^2$

$\bullet^2$ $\sin 3x = \frac{2}{3}$

$\bullet^3$ $3x = 41.8,\ 138.2$ (138.2 *stated or implied by* 46.1 in $\bullet^4$)

$\bullet^4$ 13.9, 46.1

6

$\bullet^1$ $\sin 4x$

$\bullet^2$ (trig function) × 2

$\bullet^3$ $f(x) = -1·5$

$\bullet^4$ $57·1°$

$\bullet^5$ $77·9°$

7	**(a)** $\bullet^1$ $2\sin 2x+1=0$ $\bullet^2$ $\sin 2x=-\frac{1}{2}$ $\bullet^3$ for any valid sol of equ. in form $\sin ax=-\frac{b}{c}$ $\bullet^4$ $\left(\frac{7\pi}{12},0\right)$ $\bullet^5$ $\left(\frac{11\pi}{12},0\right)$ **(b)** $\bullet^6$ 3 **(c)** $\bullet^7$ $y_C=1$ $\bullet^8$ for a strategy to make a decision about C $\bullet^9$ for making a consistent decision about C
8	$\bullet^1$ $\sin\left(2x-\frac{\pi}{6}\right)=\frac{1}{2}$ $\bullet^2$ $2x-\frac{\pi}{6}=\frac{\pi}{6},\frac{5\pi}{6}$ *(accept 30, 150)* $\bullet^3$ $x=\frac{\pi}{6},\ \frac{\pi}{2}$ $\bullet^4$ $x=\frac{7\pi}{6},\ \frac{3\pi}{2}$ Alternative for 2nd and 3rd marks $\bullet^2$ $2x-\frac{\pi}{6}=\frac{\pi}{6},\ x=\frac{\pi}{6}$ $\bullet^3$ $2x-\frac{\pi}{6}=\frac{5\pi}{6},\ x=\frac{\pi}{2}$
9	$\bullet^1$ $\sin\left(2x-\frac{\pi}{6}\right)=0\cdot5$ *stated or implied by 2nd mark* $\bullet^2$ $2x-\frac{\pi}{6}=\frac{\pi}{6}$ $\bullet^3$ $2x-\frac{\pi}{6}=\frac{5\pi}{6}$ $\bullet^4$ $\left(\frac{\pi}{6},0\cdot5\right),\ \left(\frac{\pi}{2},0\cdot5\right)$
10	$\bullet^1$ $\cos(2x-40)^\circ=\frac{1}{2}$ $\bullet^2$ $\cos^{-1}\frac{1}{3}=70.53$ $\bullet^3$ $2x-40=70.5\quad 289.5\quad 430.5\quad 649.5$ $\bullet^4$ $x=55.25\quad 164.75\quad 235.25\quad 344.75$ $\bullet^5$ $x=235.25$
11	$\bullet^1$ $\cos\left(2t-\frac{\pi}{4}\right)=1$ $\bullet^2$ $2t-\frac{\pi}{4}=0$ $\bullet^3$ $t=\frac{\pi}{8}$ $\bullet^4$ $\frac{\pi}{8},\frac{9\pi}{8}$
12	$\bullet^1$ $y=3$ $\bullet^2$ compare with $y=\sin x$ ***or*** $x-\frac{\pi}{3}=\frac{\pi}{2}$ $\bullet^3$ $x=\frac{5\pi}{6}$

13	*(a)*	•[1]	$p = -3$
		•[2]	$q = 1$
		•[3]	$r = 40$ *or* -320
		•[4]	$u = 230$
	(b)	•[5]	replace x by 0
		•[6]	–0.928
		•[7]	replace y by 0
		•[8]	120.5